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CURRENT LITERATURE

BOOK REVIEWS

Genetics

Some one once said, perhaps more epigrammatically than truthfully, "the progress of a science is in direct proportion to the mathematics used in its development." Whether generally true or not, the constant and rapid progress of genetics since the introduction of Mendel's mathematical notation is a great argument in favor of the statement. At the same time, the chaos that can result from the unwarranted use of mathematics without other premise or analysis is only too familiar to biologists. It has seemed as if those best trained in mathematics were the first to forget that their science is merely a shorthand method of stating the facts, that no more can come out than goes into the mill, though it should come out in a shape more conducive to thorough mental digestion. The slogan of certain biometricians, "there are no premises, all is treatment," has brought many biologists to that state of mind in which they could take seriously POE's sly dig in the "Purloined Letter." In speaking of the necessity of putting oneself in the mental attitude of the thief if the hiding place of the stolen letter were to be discovered, he says: "As poet *and* mathematician, he (the thief) would reason well; as mere mathematician he could not have reasoned at all."

It remained for JOHANNSEN to prove that he is poet, biologist, and mathematician, by showing some four years ago the true relation of KARL PEARSON's beautiful developments of mathematical methods to genetic research. The motto through the whole 25 chapters of his 500-page book was: "Wir müssen die Erblichkeitslehre mit Mathematik, nicht aber als Mathematik treiben!" JOHANNSEN's work on the comparative permanence of homozygous types published under the title *Ueber Erblichkeit in Populationen und in reinen Linien* (1903) had already been enthusiastically received by many investigators, partly by reason of the author's mastery of a persuasive style and partly because the conclusions fitted data with which his readers were personally familiar. For these reasons, this elaboration of his ideas met with a cordial reception that is not the fate of many textbooks. But one unfavorable criticism of any importance could be made. The author did not treat adequately the numerous genetic researches in which the problems of heredity had been attacked by methods unlike his own. There is no hesitancy, therefore, in saying that the new edition,¹ with its 30 chapters and 722 pages, to which this criticism may not

¹ JOHANNSEN, W., *Elemente der exakten Erblichkeitslehre*. Zweite Auflage. 8vo. pp. xi+723. figs. 33. Jena: Gustav Fischer. 1913.

be applied with justice (if one excepts cytological research), will be a welcome addition to genetic literature.

In its present form, the work might very easily be divided into two books with separate titles that could be used independently. The one is a thorough introduction to statistical methods as they should be used in the service of biology; the other is a well balanced discussion of the present status of genetic conceptions.

As might be expected, it has been the general discussion of heredity that has received the bulk of the revision; the chapters on biometry were admirably done in the first edition, and the static nature of their substance was such that little change has been necessary. Scarcely a word has been altered in the first five chapters, though CHARLIER's short method for determining the standard deviation has been added. In chapter 6 the discussion of mean error has been revised and a demonstration from the domain of plant physiology has been added. From this point to chapter 22, only chapters 12 and 13 are new, but the remainder of the book is entirely as written.

In chapter 12 the more recent investigations concerning the possible effect of selection on pure lines are described, while in the next chapter the "misunderstandings" of certain authors who have opposed the theory of permanence of homozygous types are taken up and disposed of with very clear logic, though the style of the rejoinder is sometimes a little caustic.

The last seven chapters of the book are so crowded with information that only a hint as to their contents can be given. They must be read by all who are interested in genetics. Sixty pages are given up to the influence of the factors of environment on variation and 160 pages to Mendelism in its various phases, including heterozygosis, inbreeding, sterility, coupling, and sex determination. Mutations are considered rather concisely in the next to the last chapter, the author being rather of the opinion that the peculiar behavior of *Oenothera Lamarckiana* will ultimately be shown to be the result of segregation and recombination, as has been suggested recently by HERIBERT-NILSSON. The final chapter is a résumé, with observations on eugenics, race hygiene, and evolution.

With reference to the position taken in his earlier work concerning the action of selection, the author remains as firm as a rock. He adds further data of his own to support his position and shows very clearly that the seemingly opposing conclusions of various investigators either are due to fallacious reasoning or are based upon material that is not easily divested of complications that confuse the main issue. To critics who deal only with generalities he makes the following reply that may well be taken to heart by those who deal with evolution from an easy chair:

Man hat mich kurzsichtig genannt, in Bezug auf die Selektion. Ich konstatiere dies mit Vergnügen; die Prämissen einer oft maszlosen spekulativen Fernsichtigkeit waren ja gerade zu untersuchen und würden wertlos gefunden.

It will doubtless surprise many that JOHANNSEN maintains a firm Lamarckian attitude throughout his book, dealing particularly sympathetically with the work of SEMON. He says: "Man hat mich ferner 'reiner Weismannianer' genannt. Jeder solche 'man' hat mein Buch nicht gelesen oder nicht verstanden." The reviewer must admit, therefore, that he has not understood the author, for after reading the volume he is still firmly convinced that in its essentials it is more nearly Weismannian than Lamarckian. Of course he would not accuse the author of maintaining the morphological hypotheses of WEISMANN with the biophores, determinants, and ids all built into a beautiful structure, but the germ-to-germ inheritance, the dependence of transmissible qualities upon germinal constitution, the invalidity of any particular assumption as to breeding power from the appearance of the soma, and the comparative freedom of the germinal substance from the influence of ordinary environmental changes, as maintained throughout the work, will be classed by most biologists as belonging rightly within the scope of WEISMANN'S conception of heredity.

Very few new terms are introduced by JOHANNSEN in this edition of his book, but two have appeared that seem justified in spite of the abuse that has been showered on the roots used. Individuals that belong to the same phenotype are "isophenous"; individuals that belong to the same genotype are "isogenous." In addition he has adopted WEBBER'S term "clone" for a bud individual.

Taken all in all, one must be very critical to have anything but praise for the new *Erblichkeitslehre*, and it is confidently predicted that it will long remain a classic.—E. M. EAST.

MINOR NOTICES

North American Flora.²—Volume 15, part 1, contains the Sphagnaceae by ALBERT LE ROY ANDREWS, the Andreaeaceae by ELIZABETH GERTRUDE BRITTON and JULIA TITUS EMERSON, and the Archidiaceae, Bruchiaceae, Ditrichaceae, Bryoxiphiaceae, and Seligeriaceae by ELIZABETH GERTRUDE BRITTON; part 2 contains the Dicranaceae and Leucobryaceae by ROBERT STATHAM WILLIAMS. New combinations occur in *Sphagnum*, *Ditrichum*, *Dicranella*, *Campylopodium*, *Oncophorus*, *Austinella*, *Leucoloma*, and *Dicrandontium*. New species are described in the following genera: *Dicranella* (2), *Dicranum* (1), *Campylopus* (4), and *Octoblepharum* (1). Volume 22, part 5, is devoted to a continuation of the Rosaceae by PER AXEL RYDBERG and contains the genera *Poterium* to *Rubus* inclusive. New species are described in the following genera: *Agrimonia* (2), *Adenostoma* (1), *Geum* (4), *Sieversia* (1), *Cowania* (1), *Cercocarpus* (7), and *Rubus* (19).—J. M. GREENMAN.

²North American Flora. Vol. 15, part 1, pp. 1-75, June 14, 1913; part 2, pp. 77-166, August 8, 1913. Vol. 22, part 5, pp. 389-480, December 23, 1913. The New York Botanical Garden.